Comparative Considerations of Irrigation Systems in Asia

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Introduction

This paper aims to grasp a future direction of irrigation in the Yellow River basin taking the present shortcomings and difficulties of irrigation management into consideration. As the Asian region can be categorized into the inland Asia and the monsoon Asia, comparative considerations of irrigation systems in the both regions will be done in a generalized manner, and then some important issues for better irrigation performance in the Yellow River basin will be discussed.

Inland Asia and Monsoon Asia

From the climatic view point the Asian region can be divided into two regions, dry/cool region and wet/warm region, by using annual precipitation of 800 mm to 1000 mm as a reference index (Mushiake, 2001). The inland Asia has a typical topographic feature of plateaus, deserts and intermountain basins with grass or bush vegetation (See Fig. 1). In this region upland crop cultivation and pasturage has been dominant in agricultural activities. The diversified upland crops, such as cereals, beans, oil-seeds, vegetables and so forth, were planted for risk avoidance of drought under none irrigated condition. Contrarily, rice cultivation combined with aqua-culture and poultry has been observed in the monsoon Asia blessed with much precipitation. These different conditions lead dissimilar approaches of irrigation systems in the two regions.

Irrigation in Inland Asia

Due to low precipitation rate the complete irrigation, supplying irrigation water in the all

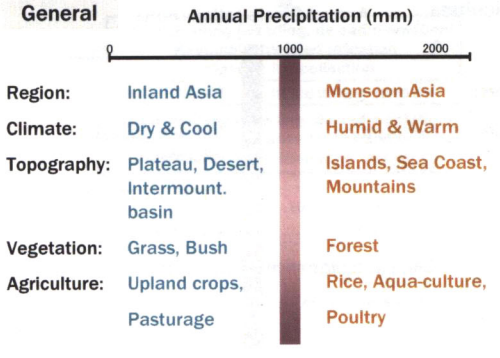

Fig. 1 General features of inland Asia and monsoon Asia

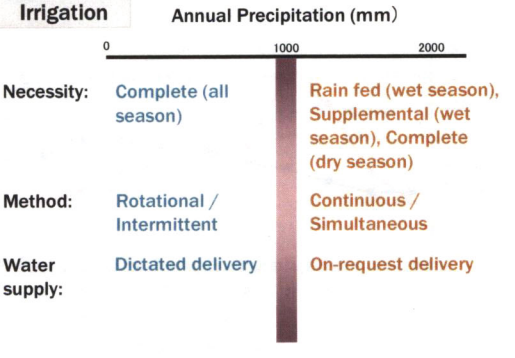

Fig.2 Irrigation features of inland Asia and monsoon Asia

seasons of a year, has been needed in the inland Asia as shown in Fig. 2. Usually, the rotational and intermittent water supply was achieved under dictated delivery for water saving in which a responsible agency decided on water delivery based on the water requirement of crops (Ankum, 1998). The continuous and simultaneous water supply is a different nature of irrigation shown in the monsoon Asia, in which on-request delivery has been performed. In the on-request delivery a responsible agency endorsed the requests and adjusts the system when a water users group makes official requested on its supply.

In terms of solidity in water use, the rotational and intermittent method keeps scheduled water distribution not paying much attention to crop growth. In other words, so-called "bureaucratic administration in irrigation management" has been widely accommodated with the inland Asia, especially in the large-scale irrigation system. This nature of irrigation management sometimes forced a farmer to exploit a private tube-well for supplemental supply of groundwater in his/her upland field. Another shortcoming in the large-scale irrigation systems is imbalance water allocation among tertiary units. As shown in Fig. 3, large discrepancy between demand and supply is occasionally revealed in the inland Asia.

Difficulties and Urgent Issues in Irrigation Systems

Irrigation systems in the inland Asia faced with some common difficulties in the recent decade as shown in Fig. 4. Among these water losses, imbalance water allocation and salinization stems from a same cause, i.e. poor operation and maintenance (O & M) of irrigation system. In the sense of economic development farmers retain strong incentives in income generation by introducing cash crops which, in turn, will motivate farmers to participate in O & M activities. Thus farmers' involvement in irrigation management becomes one of the most urgent issues in the inland Asian region.

In order to solve the above-mentioned issues a careful approach may be necessary; 1) water users group in the tertiary unit of irrigation system should be established for O & M works, 2) the responsible agency that manages the main-stay facilities of irrigation should carry out reliable

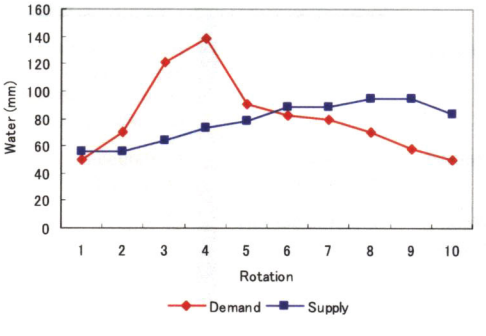

Fig. 3 Water demand and supply of Pyaungbya in the dry zone of Myanmar (Mizutani, 2002)

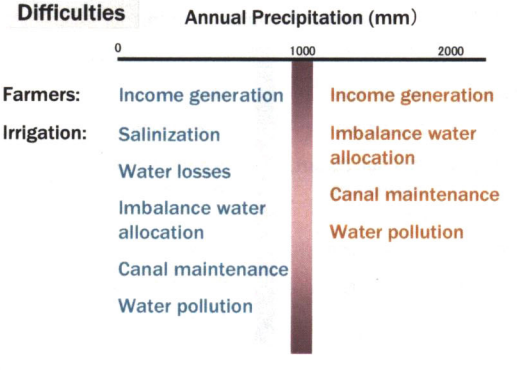

Fig. 4 Difficulties in the irrigation systems of inland Asia and monsoon Asia

water delivery to the tertiary unit, 3) fair on-farm water distribution should be conducted by the water users group, and 4) Each farmer should be allowed to plant any kinds of cash crops under explicit duty and right of membership.

The responsible agencies can only find out the solution of water losses and salinization because they have the ability to investigate and assess the causes. The problem related to water contamination has the same character. These problems can be solved by close coordination of farmers, water users groups and responsible agency so that relationship among stakeholders is needed to further consideration.

Role of Stakeholders in Large Scale Irrigation

Stakeholders in large scale irrigation, in general, are composed of three entities; 1) farmers, 2) water users group, and 3) responsible agency. However, there is a tendency that "bureaucratic administration in irrigation management" is lacking for the water users group because of centralized nature. This drawback misses to implement regular O & M activities which results in improper condition of irrigation facility. Irrigation fee payment by farmers either in cash, labor or materials contributes to overcome this problem. The water users group as well as the responsible agency will not be able to carry out adequate irrigation management without farmers' participation as shown in Fig. 5.

In terms of relationship between stakeholders we can observe three types in the Asian region; 1) bureaucratic control, 2) membership, and 3) contract as shown in Fig. 6. Between the responsible agency and the water users group the bureaucratic control type dominates in the government-managed irrigation schemes like Myanmar, while the membership type in Japan. The contract type can not be found except in P. R. China. For better irrigation management "what relations are appropriate between stakeholders in large scale irrigation" is still unsolved question. In other words the question might be solved under deliberate considerations taking real conditions into account.

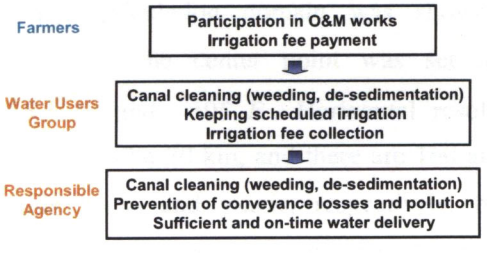

Fig. 5 Role of stakeholders in large scale Irrigation

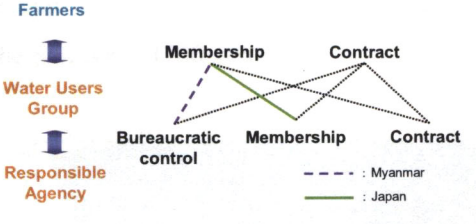

Fig. 6 Relations between stakeholders in large scale irrigation

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